CARDIOVASCULAR HEALTH

Exploring a Potential Link between BPA and Heart Disease

Most people in the United States are exposed to the plastic monomer bisphenol A (BPA), whether in plastic linings in food cans, containers made of hard plastic, or other plastics and foods containing BPA. Exposure to this suspected endocrine disruptor is illustrated by urine samples collected for NHANES (the National Health and Nutrition Examination Survey), for which the Centers for Disease Control and Prevention surveys thousands of adults and children. A new analysis of NHANES data published 13 January 2010 in *PLoS ONE* adds more evidence for an association between heart disease and higher exposures to BPA, even at the relatively low levels seen in the general population.

David Melzer, an epidemiologist at the University of Exeter, United Kingdom, and his colleagues first looked at NHANES data collected from 2003 and 2004; their results, published in the 17 September 2008 issue of *JAMA*, were the first to show an association between higher levels of BPA metabolites in urine and adverse adult health outcomes, including heart disease. The current analysis considered NHANES data from 2005 and 2006. Although the BPA levels in urine samples from this new group of people were lower by almost a third, the association remained between coronary heart disease and higher urinary BPA.

While this study may help inform future research, such cross-sectional studies "should not be used to demonstrate that a particular chemical can cause a particular effect," said Steven G. Hentges of the Polycarbonate/BPA Global Group of the American Chemistry Council in a 13 January 2010 press release. And indeed, Melzer and his colleagues emphasize that because this study is cross-sectional—a snapshot in time instead of a long-term observational investigation—they cannot say whether BPA contributes to heart disease or if heart disease changes the exposure to or metabolism of BPA in adults. "What would really help is if industry and regulators could support independent studies [to examine] whether high BPA levels are present before any disease started," Melzer says.

"Chasing human [data] is the way forward," says Richard Sharpe, an endocrinologist from The Queen's Medical Research Institute in Edinburgh who did not participate in the research. NHANES provides a robust data set, he says, and the repeatability of the association with a second survey group is positive. However, that replication is somewhat incomplete because not all of the associations found with BPA in the first study were found in the second.

"The more logical interpretation of the results as they stand at the moment is that they are looking at two variables that are associated with something else," Sharpe says. Diet, for instance, is a major contributor to heart disease in the United States and also a major source of BPA exposure. "We should remember that heart disease develops over a long period of time," Sharpe says, "so if BPA is involved causally, a cross-sectional study such as this [*PLoS ONE* report] cannot show this."

Scott Belcher, a scientist at the University of Cincinnati, says the association in humans is "not super surprising in light of our animal studies and because we already know estrogens are related to various cardiovascular end points." Belcher's team reported at the June 2009 Endocrine Society annual meeting that BPA exposure *in vitro* in muscle cells and in whole hearts from female rodents leads to arrhythmias, and they recently received American Recovery and Reinvestment Act funds from the NIEHS to conduct further research on BPA in mice. Meanwhile, pending the release of an updated toxicology review for BPA, the Food and Drug Administration announced in January 2010 it is "taking reasonable steps to reduce human exposure to BPA in the food supply."

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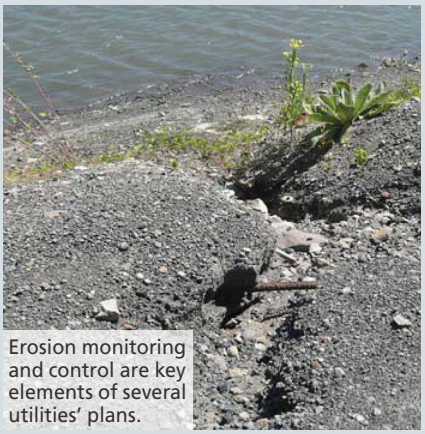
The Beat | by Erin E. Dooley

EPA Releases Utilities' Plans for Coal Ash Impoundment Safety

Since the December 2008 collapse of the Kingston Fossil Plant coal ash impoundment in Tennessee, which spilled 5.4 million yd³ of ash into the Emory River, the U.S. EPA has been conducting on-site assessments of impoundments at electric utilities across the country. On 4 February 2010 the agency released plans submitted by 22 utilities that detail how they are making their coal ash ponds safer through measures such as adding riprap and vegetation to strengthen earthen impoundment walls. In a press release the EPA said it is "continuing to review the reports and technical recommendations, and is working with the facilities to ensure that the recommendations are implemented in a timely manner.



Erosion monitoring and control are key elements of several utilities' plans.

U.S. EPA

Rating the Sustainability of Roads

In January 2010 the University of Washington and engineering firm CH2M Hill released Greenroads™, a new system that rates the sustainability of road design and construction projects similarly to how programs such as LEED® rate and certify buildings. Minimum requirements for Greenroads certification include a noise mitigation strategy and a life cycle energy and emissions analysis for paving materials. Extra points are awarded for voluntary measures such as avoiding light pollution, using permeable pavements to reduce stormwater runoff, and adding lanes for bicycles and pedestrians.

New Lighting from Nanofibers

RTI International has developed a novel lighting technology that it says is 5 times more energy-efficient than incandescent bulbs and, unlike compact fluorescent lamps (CFLs), uses no mercury-containing components. RTI's new technology, which was partially funded by the Department of Energy, pairs high-performance nanofiber-based reflectors with photoluminescent nanofibers to create light its developers say has better color rendering properties than is typically found with CFLs. The new technology could hit the market within 3–5 years.

What Cd Means to CVD

A study by Junenette Peters and colleagues in the February 2010 issue of *Environmental Research* adds evidence to the idea that exposure to low levels of cadmium may be linked to cardiovascular disease. Using data

INFECTIOUS DISEASE

Americas' Dengue Escalation Is Real—and Shifting

Although there has been a perceived increase in dengue cases in the Americas since 1980, the epidemiology of this disease has not been well documented. A new analysis of 3 decades' worth of data indicates, however, that dengue is indeed hyperendemic in the Americas—that is, exhibiting a sustained and growing high incidence. All told, the incidence rate of dengue rose 4.3-fold between the periods 1980–1989 and 2000–2007, the team reports, and the rate of the more severe dengue hemorrhagic fever (DHF) rose 8-fold. Their findings, based on data from the Pan American Health Organization and selected ministries of health, were published in the January 2010 *American Journal of Tropical Medicine and Hygiene*.

Dengue is spread by mosquitoes, predominantly *Aedes aegypti*. It affects an estimated 50 million people annually in about half the world's countries, and the numbers continue to rise even as many cases go unreported. The 4 known serotypes of the flavivirus that causes dengue induce symptoms such as fever, headache, liver dysfunction, and muscle, joint, or abdominal pain. DHF and dengue shock syndrome, which is frequently fatal, appear to be more likely after a person is reinfected by unique strains of virus of a different serotype.

There is no effective vaccine for dengue or treatment besides rest and drinking plenty of fluids. The disease is believed to have been present in the Americas for more than 200 years and was effectively controlled in the 1950s and 1960s through infrastructural changes such as better public health systems, housing, piped water systems, and systematic pesticide application. Sustained control efforts waned when it appeared the disease had been beaten, and epidemic dengue began a dramatic re-emergence in the late 1970s [see "Dengue Reborn: Widespread Resurgence of a Resilient Vector," *EHP* 116:A382–AA388 (2008)].

From 1980 through 1989 more than 1 million cases of dengue were reported, mostly in Hispanic Caribbean countries, followed closely by Central America and Mexico. More recently, the number of cases has soared, with more than 4.7 million reported between 2000 and 2007. Nearly two-thirds of these cases occurred in Brazil, Paraguay, Argentina, Chile, and Uruguay; the incidence rate rose more than 15-fold from 1980–1989 to 2000–2007. The rate in the Andean subregion (Bolivia, Colombia, Ecuador, Peru, and Venezuela) increased more than 7-fold. It tripled in the non-Hispanic Caribbean and doubled in Central America and Mexico. The worst incidence of DHF for 2000–2007, at 7.3% of all cases, was in the Andean subregion. For all the Americas, the DHF percentage for 2000–2007 was 2.3%, nearly double the rate for 1980–1989.

There is a consistent connection between the local rainy season and increased cases, but the evidence of a dengue–climate change link remains incomplete. "Global climate has become generally more suitable for dengue over the past fifty years," says Simon Hales, a senior research fellow at New Zealand's University of Otago whose areas of expertise include epidemiology and climate variability. "However, observed changes in dengue cannot yet be linked to climate change."

Duane Gubler, director of Duke University's Emerging Infectious Disease Research Program in Singapore, says the increased frequency of dengue is largely driven by uncontrolled urbanization and lack of effective vector control in tropical and subtropical developing countries, combined with travel to and from those areas by hundreds of millions of people via modern transportation. Other suspected contributors include increased spread of the 4 serotypes and improved reporting. To help counter the dengue threat, "a vaccine will be an important tool for prevention and control," says Gubler. "But we should not ignore vector control, especially in view of the emergence of other *Aedes aegypti*–transmitted diseases such as yellow fever and chikungunya."

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Low-level cadmium exposure may contribute to cardiovascular disease.

from the National Health and Nutrition Examination Survey, the team found that a 50% increase in blood cadmium was associated with a 35% increase in stroke prevalence and a 48% increase in heart failure prevalence, while the same change in urinary cadmium was associated with 9% and 12% increases, respectively. Although smoking explained their findings in part, the researchers believe other exposures to cadmium, such as through food and metal and ceramic food containers, should be considered in both research and risk assessment for cardiovascular diseases.

China Completes First National Pollution Census

On 9 February 2010 the Chinese government announced it had completed the country's first national census of pollution, a 2-year effort by almost 600,000 staff that mapped nearly 6 million pollution sources. This survey is the first time Chinese environmental authorities have been able to include agricultural sources of pollution in their data. Among other applications, these findings will help guide China's next 5-year environmental protection plan to begin in 2011. However, the full survey results are available only to selected government officials. Environmental advocates are calling for the government to release details of the survey to the public.

Communities Warm Up to Woodstove Changeout Programs

As part of the U.S. EPA's Great American Woodstove Changeout campaign, more than 45 U.S. communities now provide financial incentives to residents who trade in old stoves for newer, less polluting models or pellet, gas, or propane appliances. Many of the older woodstoves in use can emit up to 10 times as much particulate matter as newer stoves, according to the EPA. As of January 2010, the agency estimated more than 13,000 woodstoves and fireplaces had been replaced under such programs, saving an estimated 248 tons of particulate matter emissions and $84 million in health benefits per year.

Left to right: Joseph Tart/EHP; U.S. EPA